Corsica River Tidal Monitoring for Assessing Water Quality Criteria

Bruce D. Michael
Chris J. Heyer

Maryland Department of Natural Resources
Tidewater Ecosystem Assessment
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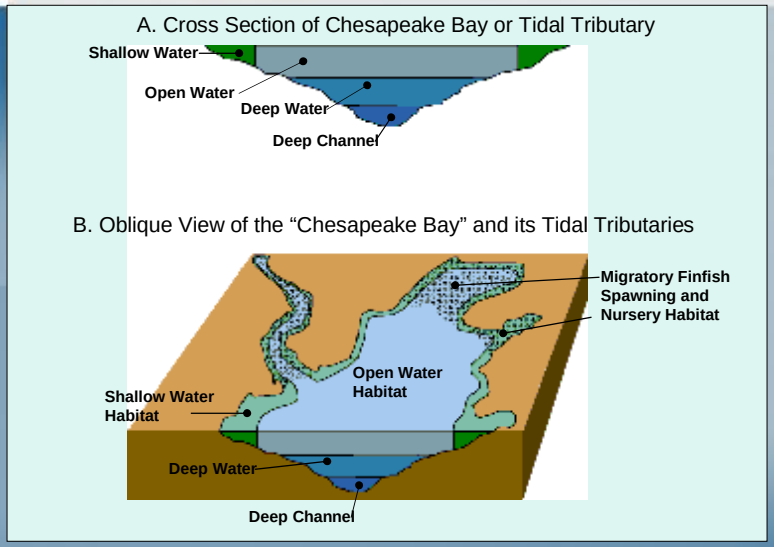
Presentation Summary

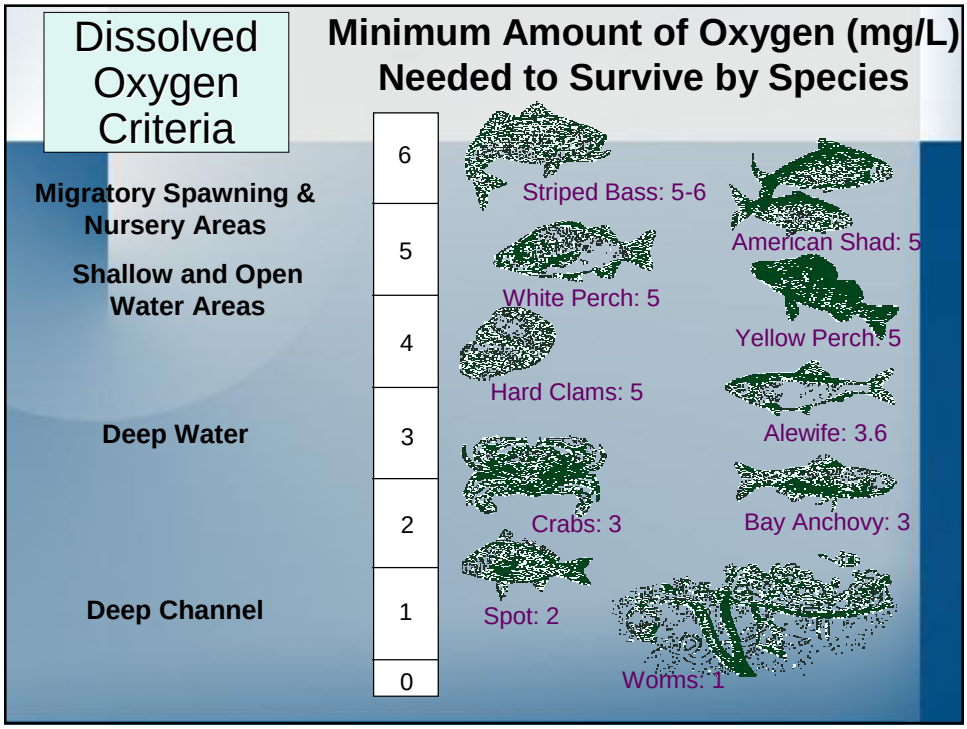
- New Chesapeake Bay water quality criteria
- Considerations for implementing water monitoring in the Corsica River
- Shallow Water Monitoring technologies
  - Continuous monitors
  - Water Quality Mapping (DATAFLOW)
- Corsica River tidal monitoring plan

Water Quality Monitoring Objectives

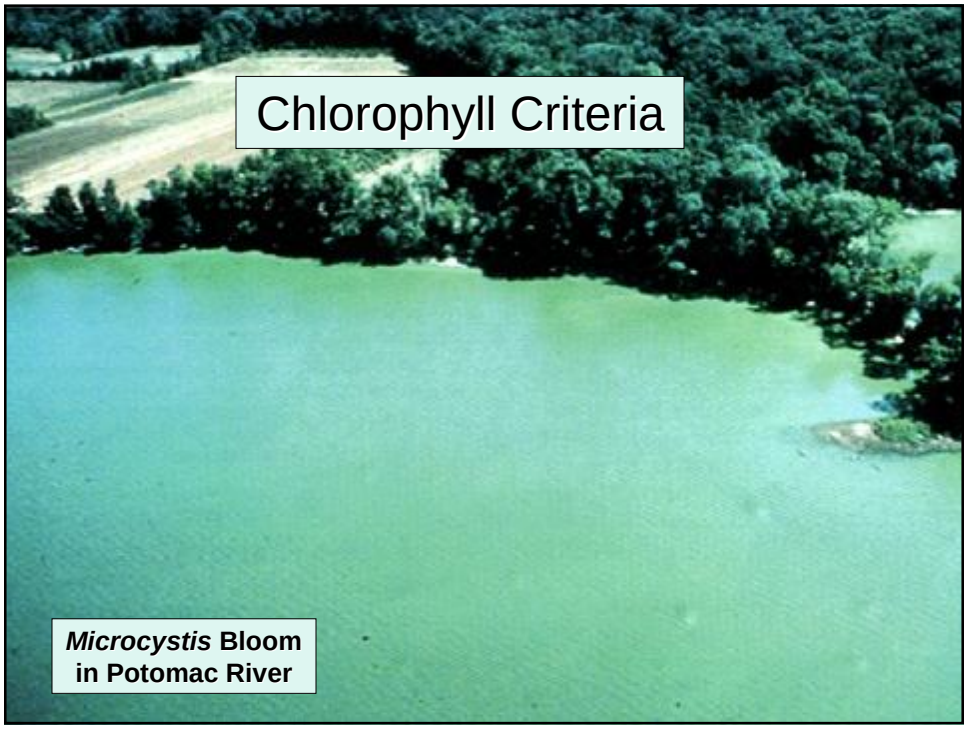
- Primary objective:
  - Assess new water quality criteria for
    - dissolved oxygen,
    - water clarity and
    - chlorophyll
- Secondary objectives:
  - Deployable near-term, sustainable long-term
  - Provide information for characterizing system
  - Measurements must be able to be integrated with other monitoring components in data analyses
  - Provide information to help understand ecosystem processes

The New Bay Agreement Requires Restoration Goals for 5 Designated and 3 Criteria




Dissolved Oxygen Criteria
Minimum Amount of Oxygen (mg/L) Needed to Survive by Species
Migratory Spawning & Nursery Areas
Shallow and Open Water Areas
Deep Water
Deep Channel
6
5
4
3
2
1
0
Striped Bass: 5-6
American Shad: 5
White Perch: 5
Yellow Perch: 5
Hard Clams: 5
Alewife: 3.6
Crabs: 3
Bay Anchovy: 3
Spot: 2
Worms: 1


Water Clarity Criteria
Photo Courtesy of VIMS



Application of Water-Quality Criteria

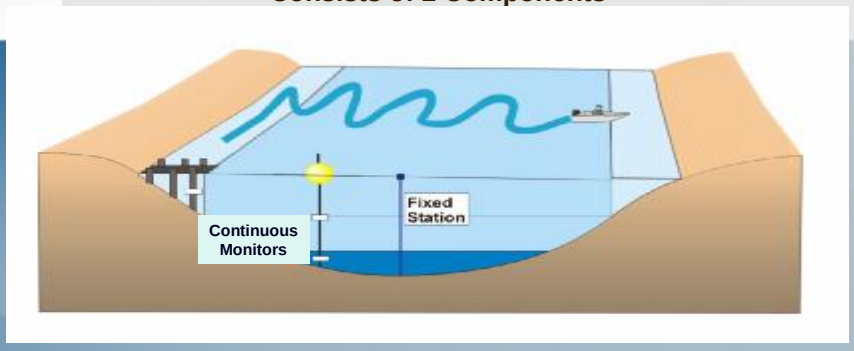
	Dissolved Oxygen	Chlorophyll *a*	Water Clarity
Migratory Spawning and Nursery	X	X	
Shallow Water	X	X	X
Open Water	X	X	
Deep Water	X		
Deep Channel	X		

		Attainment of Criteria
		Insufficient Data to Assess
		Non-Attainment of Criteria

			Water Quality Criteria											
			Dissolved Oxygen					Water Clarity			Chl *a*	Disposition by Segment/DU Pair	Listing Category	Aquatic Life Support Use
			30D	7D	1D	IM	Special Sturgeon	SAV Acres	WC Acres	SAV + WC*2.5	NARR			
CB1TF	MSN			6		5						Insufficient Data	3	
	SWSAV							12,908				Insufficient Data	3	5
	OW	Annual	5.5	4		3.2	4.3					Insufficient Data	3	
CB2OH	MSN			6		5						Insufficient Data	3	
	SWSAV							302				Meets	2	5
	OW	Annual	5	4		3.2	4.3					Fails	5	
CB3MH	MSN			6		5						Insufficient Data	3	
	SWSAV							943				Insufficient Data	3	
	OW	Summer	5	4		3.2	4.3					Insufficient Data	3	5
	OW	ROY	5	4		3.2	4.3					Fails	5	
	DW	Summer	3		2.3	1.7						Fails	5	
	DC	Summer				1						Fails	5	
CB4MH	MSN			6		5						Insufficient Data	3	
	SWSAV							2,511				Insufficient Data	3	
	OW	Summer	5	4		3.2	4.3					Insufficient Data	3	5
	OW	Fall	5	4		3.2	4.3					Fails	5	
	DW	Summer	3		2.3	1.7						Fails	5	
	DC	Summer				1						Fails	5	
CB5MH - ALL	SWSAV							14,961				Insufficient Data	3	
	OW	Summer	5	4		3.2	4.3					Insufficient Data	3	
	OW	Fall	5	4		3.2	4.3					Fails	5	5
	DW	Summer	3		2.3	1.7						Fails	5	
	DC	Summer				1						Fails	5	
CB5MH - MD	SWSAV											Insufficient Data	3	
	OW	Summer	5	4		3.2	4.3					Insufficient Data	3	
	OW	Fall	5	4		3.2	4.3					Fails	5	5
	DW	Summer	3		2.3	1.7						Fails	5	
	DC	Summer				1						Fails	5	
CB5MH - VA	SWSAV											Insufficient Data	3	
	OW	Annual	5	4		3.2	4.3					Insufficient Data	3	5
	DW	Summer	3		2.3	1.7						Fails	5	
	DC	Summer				1						Fails	5	
CB6PH	SWSAV							980				Insufficient Data	3	
	OW	Summer	5	4		3.2	4.3					Fails	5	5
	DW	Summer	3		2.3	1.7						Fails	5	
CB7PH	SWSAV							14,620				Insufficient Data	3	
	OW	Summer	5	4		3.2	4.3					Fails	5	5
	DW	Summer	3		2.3	1.7						Fails	5	
CB8PH	SWSAV							6				Meets	2	5
	OW	Spring	5	4		3.2	4.3					Insufficient Data	3	

Shallow Water Monitoring Design

Consists of 2 Components



- Continuous Monitors
  - All criteria
  - Shallow-water designated use
- Water Quality Mapping
  - All criteria
  - Shallow & open-water designated use
- Existing Fixed Stations
  - All criteria
  - All but shallow-water designated use

Continuous Monitoring Site Selection

- 2 sites per segment (Corsica will have 2 plus a water quality profiler)
- Purpose
  - Represents upstream and downstream conditions
  - Provides temporal resolution for evaluating WQ criteria
  - Calibration for water quality mapping
  - Event based monitoring – fish kills, algal blooms, sediment plums
- Calibration
  - Weekly to biweekly calibration with full suite of nutrients, light attenuation, chlorophyll and TSS

Water Quality Mapping (DATAFLOW)

- Purpose
  - Provides spatial resolution for evaluating new WQ criteria
  - Targeting SAV restoration activities
  - Determining factors in meeting SAV goals
  - Assessing habitat for fish, oysters and other living resources
- Calibration
  - A minimum of 5 calibration sites/cruise with full suite of nutrients, light attenuation, chlorophyll and TSS
  - Long-term water quality site is one calibration point to foster integration between program

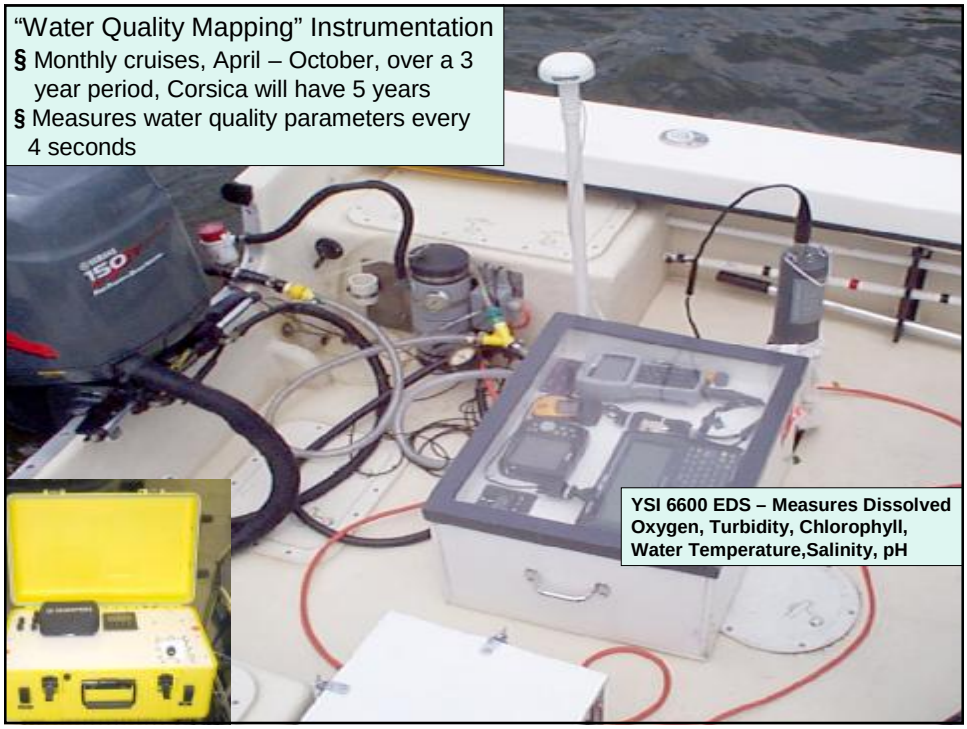
Continuous Monitors

- Generally, deployed April – October, over a 3-year period – Corsica will have sites year round for 5 years
- A subset of meters are telemetered real-time to web site
- Measures water quality parameters every 15 minutes

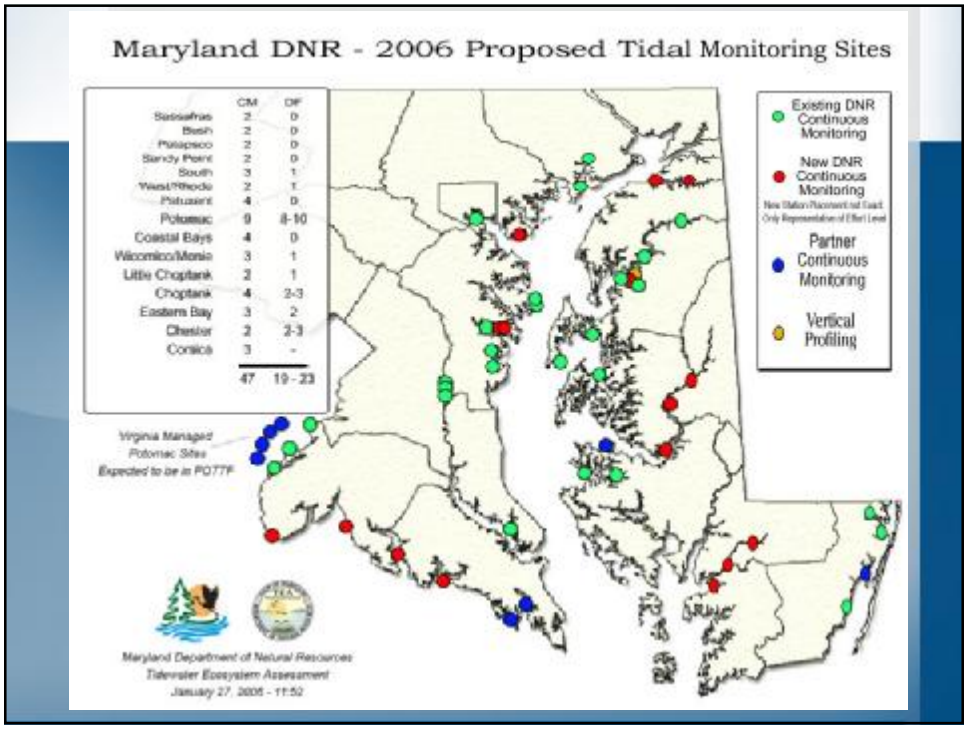
YSI 6600 EDS – Measures Dissolved Oxygen, Turbidity, Chlorophyll, Water Temperature,Salinity, pH

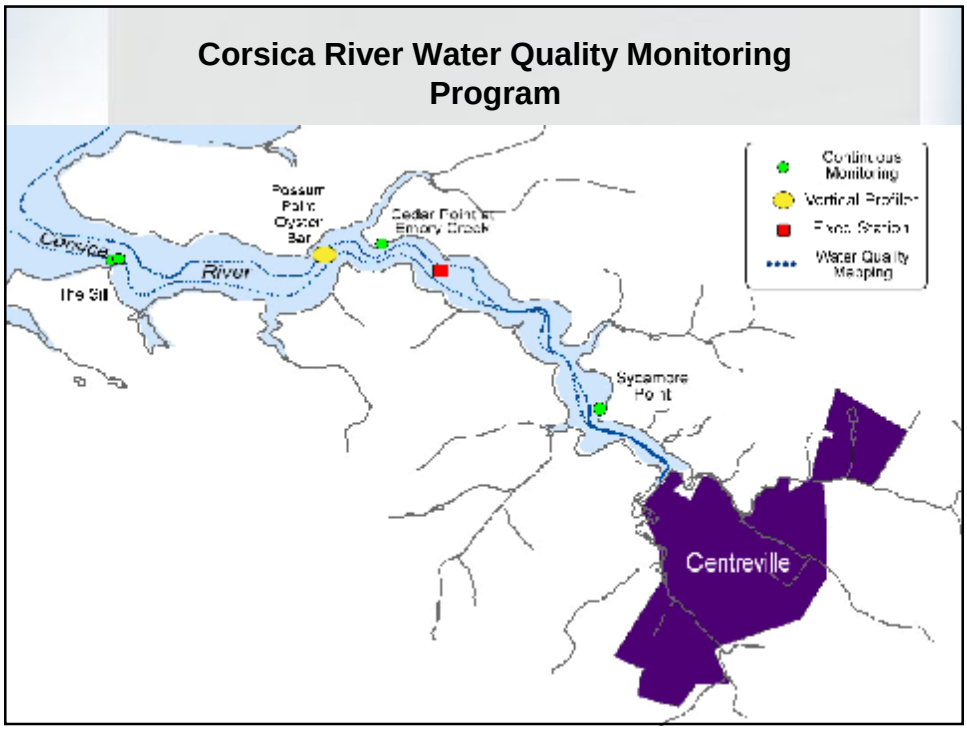
"Water Quality Mapping" Instrumentation

- Monthly cruises, April – October, over a 3 year period, Corsica will have 5 years
- Measures water quality parameters every 4 seconds



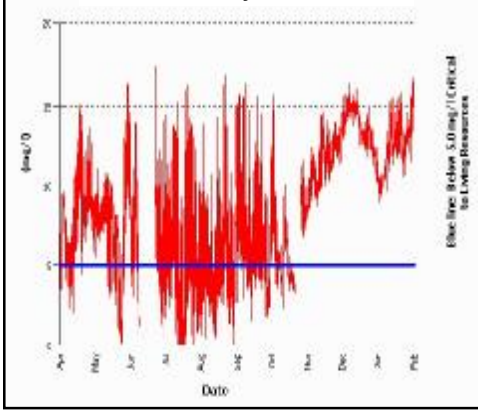
YSI 6600 EDS – Measures Dissolved Oxygen, Turbidity, Chlorophyll, Water Temperature,Salinity, pH


Maryland DNR - 2006 Proposed Tidal Monitoring Sites
CM DF
Sassafras 2 0
Bush 2 0
Patapsco 2 0
Sandy Point 2 0
South 3 1
West/Rhode 2 1
Patuxent 4 0
Potomac 9 8-10
Coastal Bays 4 0
Wicomico/Monie 3 1
Little Choptank 2 1
Choptank 4 2-3
Eastern Bay 3 2
Chester 2 2-3
Corsica 3 -
47 19 - 23
Existing DNR Continuous Monitoring
New DNR Continuous Monitoring
Partner Continuous Monitoring
Vertical Profiling
Virginia Managed Potomac Sites Expected to be in PO7TF
Maryland Department of Natural Resources
Tidewater Ecosystem Assessment
January 27, 2006 - 11:52

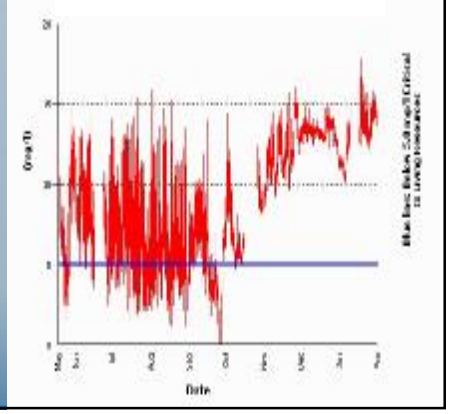

Corsica River Water Quality Monitoring Program
Continuous Monitoring
Vertical Profiler
Fixed Station
Water Quality Mapping
Possum Point Oyster Bar
Cedar Point
Emory Creek
Corsica River
The Sill
Sycamore Point
Centreville

2005 Low Dissolved Oxygen values exceeding criteria limit of 5 mg/l

Corsica River - Sycamore Point

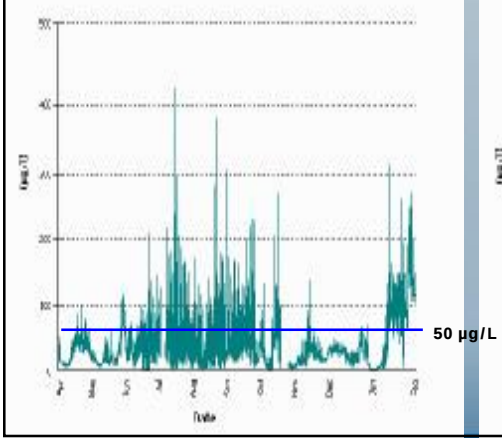


Corsica River - Cedar Point

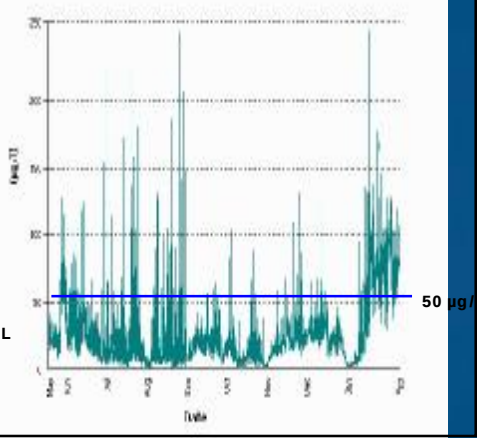


High chlorophyll values depicting winter bloom of Heterocapsa

Corsica River - Sycamore Point



Corsica River - Cedar Point



Corsica River Fish Kill Event 9/25-29/05